[0182] The sample chamber is a chamber defined within a cartridge that is adapted for receiving a sample to be analyzed in the cartridge. The sample chamber includes a sample introduction port for introducing sample into the chamber. The port is preferably an opening in the cartridge that provides access to the sample chamber. Alternatively, the port may be a membrane or septa through which a sample may be injected into the sample chamber, e.g., through the use of a needle or cannula. Preferably, the cartridge also includes a sealable closure for sealing the sample introduction port and preventing leakage of the sample and possible exposure of the user and/or associated instruments to biohazards. Preferably the sealing/capping mechanism utilizes a hinged configuration so that the sample chamber is easily accessed and sealed. In particularly preferred embodiments the sealing/capping mechanism incorporates a flexible hinge, e.g., rubber, plastic or the like. Most preferably, the sample chamber is adapted and configured to receive a modular detachable insert that includes a cap for sealing the sample chamber. Use of a modular detachable insert within the sample chamber also allows for independent selection of materials for the main cartridge body. In an alternative embodiment, sealing of the sample introduction port is achieved by applying an adhesive tape to the port. The sample chamber may contain dry reagents used in carrying out the assay that reconstitute on addition of a liquid sample. Optionally, the sample chamber contains an anti-foam agent to prevent foaming of the sample in the cartridge.

[0183] The sample chamber is connected to a sample conduit for transferring fluids from the sample chamber to other fluidic components in the cartridge. The sample chamber may also be connected to a vent port and/or a reagent chamber (e.g., through fluidic conduits). In a preferred configuration for receiving liquid samples, the sample chamber is connected to a sample conduit and a vent port. A cross-sectional view of a preferred embodiment is shown in **FIG. 27**. Sample chamber **2710** has sample introduction port **2720** and is linked to sample conduit **2730** and sample vent port **2740** (through vent conduit **2750**). Sample conduit **2730** is advantageously arranged to intersect sample chamber **2710** at or near the bottom of the chamber (relative to the orientation of the cartridge during operation) so as to allow for efficient transfer of a large fraction of the sample volume without the introduction of bubbles. Vent conduit **2750** is advantageously arranged to intersect sample chamber **2710** above sample conduit **2730** and at a height that is greater than the anticipated sample fill level height to avoid possible contamination of the instrument and/or escape of the sample fluid. Preferably, vent conduit **2750** has sufficient volume in the fluidic conduit so that a small amount of sample fluid, e.g. as may be observed if the sample is foamy or has bubbles, may enter the conduit without being pulled all the way to vent port **2740**. In one embodiment, as depicted in **FIG. 9**, a well/trap **975** may be arranged within the fluidic conduit. In another embodiment, as depicted in **FIG. 20**, the fluidic conduit may be extended/lengthened, e.g., utilizing a serpentine configuration **2030**.

[0184] Cap **2760** can be used to seal sample introduction port **2720** without preventing the flow of air through vent conduit **2750**. In **FIG. 27**, the fluidic compartments and conduits are formed by recesses (e.g., channels) or holes in cartridge body **2770** and by cover layer **2780** which is sealed against cartridge body **2770**. Sample chamber **2710** has internal ledge **2790**. Vent conduit **2750** includes a vertical hole from the bottom of cartridge body **2770** to the top face of ledge **2790**. This arrangement provides for a simplified manufacturing process that is amenable to injection molding or machining of the cartridge body; other arrangements of the vent conduit will be readily apparent to the skilled artisan.

[0185] In one embodiment of the sample chamber, a separate vent port and vent conduit are omitted and the sample introduction port also provides a vent port, e.g., the sample introduction port aperture also acts as a vent port. The vent port may also be provided through the top of the sealing/capping mechanism by, e.g., incorporating a vent hole in the top surface of the sealing/capping mechanism. An alternative embodiment may employ a scheme whereby the cartridge reader itself can include a piercing/venting mechanism that is adapted and configured to pierce through the top surface of the flexible sealing/capping mechanism. In a particularly preferred embodiment, the sealing/capping mechanism is adapted and configured to be self-sealing upon withdrawal/removal of the piercing/venting mechanism, e.g., via the use of a septum preferably comprising an elastomeric material. The advantage of a self-sealing cap mechanism is that the sample cannot escape from the sample chamber once the piercing/venting mechanism has been removed.

[0186] The sample chamber may also include a filter for, e.g., removing particulate matter that may be present within the sample itself or that may be present as a result of using a swab or the like to introduce sample into the sample chamber. A preferable embodiment may employ a filter that not only removes any particulate matter but that is also designed to separate red blood cells (RBC) from blood plasma; e.g., where the particular assay/assay format requires blood plasma as the sample. Such a filter can be an integral cross-flow filter, in-line filter or the like. Preferably, the filter is arranged at or near the entrance of the sample conduit.

[0187] In a preferred embodiment for extracting analytes from a solid matrix or a matrix that comprises solids (e.g., for extracting analytes from an absorbent material (e.g., a cotton ball, piece of filter paper, etc.), an applicator stick, dirt, food, sludge, feces, tissue, etc.) the sample chamber is connected to a reagent chamber (e.g., via a reagent conduit) comprising an extraction reagent, e.g., an extraction reagent disclosed in U.S. Provisional Patent Application 60/436,591, filed Dec. 26, 2002, entitled Methods Compositions and Kits for Biomarker Extraction, hereby incorporated by reference. Applicator stick is used herein to refer to a sample collection device comprising an elongated handle (preferably a rod or rectangular prism) and a sample collection head (preferably comprising an absorbant material or, alternatively, a scraping blade) configured to collect sample from a surface or biological tissue) and includes sample collection swabs and tissue scrapers. The reagent conduit and sample conduit are, preferably, arranged to intersect the sample chamber at or near opposing ends of the chamber so that reagent introduced through the reagent conduit is drawn through the sample before passing into the sample conduit. More preferably, the sample chamber has an elongated shape with the two conduits being arranged to intersect at or near the opposing ends of the length. The sample chamber may also include a filter, as described above, for removing solid